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An Absorbent Component for use in disposable absorbent articles, such as diapers or incontinence guards

The present invention relates to an absorbent component or absorbent element for use in disposable absorbent articles, such as diapers or incontinence guards.

It is possible to control the dispersion of liquid within an absorbent body or pad highly effectively, and therewith guide the flow of liquid to those parts of the pad which exhibit the greatest absorbency. Furthermore, the use of so-called superabsorbents, now being used to progressively greater extents, enables the absorbent pad to be made smaller while still possessing sufficient absorbency. Thus, it is possible to obtain sufficient absorbency with an absorbent material of relatively small volume.

However, it is difficult to utilize the possibilities afforded by present-day highly absorbent material optimally, owing to the fact that liquid is not transported into the absorbent pad quickly enough. For instance, when a large quantity of liquid is discharged almost simultaneously, the surface layer of the absorbent pad can become saturated locally in the vicinity of the wetting point. This means that the discharged liquid will spread along the surface of the outer layer. This can result in leakage if the liquid-permeability of the surface layer, i.e. the amount of liquid that can be sucked into the surface layer per unit of time, is not sufficiently great to fully manage to take care of a liquid flow which is dispersed from the wetting point by surface spreading or dispersion. Furthermore, leakage can also occur when the total capacity of the absorbent pad is concentrated to an area around the wetting point, owing to the fact that the residual

capacity of the absorbent pad is insufficient to handle the amount of liquid which spreads from the wetting point when a large quantity of liquid is discharged simultaneously.

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The object of the present invention is to solve this problem by providing an absorbent component or element which exhibits high liquid permeability, so as to reduce the spread of liquid around the wetting point of an absorbent pad.

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This object is achieved in accordance with the invention with an absorbent component intended for use with disposable absorbent articles, such as disposable  
15      diapers or incontinence guards, said component being characterized in that it comprises at least two layers of absorbent material which are perforated in a given pattern; and in that the perforation patterns of mutually adjacent layers are displaced relatively to one  
20      another so that the perforations in said layers will not lie in register with one another. When this component is used as an absorbent which lies closest to the skin in the region around the wetting point of a diaper or an incontinence guard, a large part of the  
25      liquid discharged at the wetting point will flow through the channels formed by the perforations and therewith result in a reduction in liquid spread and enable the absorption capacity of the pad to be utilized more rapidly.

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These and other features of the invention and advantages afforded thereby will be more apparent from the following description of an exemplifying embodiment of the invention made with reference to the accompanying  
35      drawing, in which

Figure 1 is a perspective view, partly cut away, of part of a material web from which an absorbent component according to the invention can be produced;

Figure 2 is a top view of the web part illustrated in Figure 1; and

Figure 3 illustrates an absorbent component configured in accordance with the invention.

Figure 3 is a cross-sectional view of a preferred embodiment of the inventive absorbent component. This component is composed of four superimposed layers of absorbent material 1. Each layer is perforated with holes 2 in a determined pattern. The hole pattern in each layer is displaced relatively to the pattern in adjacent layers, such as to produce winding flow paths through which liquid can flow through the absorbent component.

Figure 1 is a perspective view of a material web from which the absorbent component shown in Figure 3 can be produced. The web is preferably in the form of a cellulose fluff mat in which holes 2 have been punched. The mat may optionally incorporate so-called super-absorbents. It is also conceivable to use a mat of wadding which incorporates superabsorbent material.

The inventive absorbent component can be used to great advantage as a component part of a diaper or an incontinence guard, in which case the component is used as the innermost layer of the absorbent pad, i.e. when used being placed nearest the wearer's body within the region lying closest to the wetting point. When liquid

is discharged, part of the liquid will be absorbed in the uppermost layer of the absorbent component while part of the liquid will flow through the holes 2 in said uppermost layer and part of this liquid will be absorbed in the second layer with the remainder of the liquid passing through the holes 2 in said layer and being absorbed in part in the third layer. The remainder of the liquid will flow through the holes 2 in said third layer to the fourth layer, where part of said liquid is absorbed and the remainder of the liquid flows through the holes of the fourth layer and onto the underlying parts of the absorbent pad in which the absorbent component is included. Thus, liquid is rapidly transported from the surface of the absorbent component into the absorbent pad therebeneath.

When a large quantity of liquid is discharged at the wetting point, almost simultaneously, the major part of this liquid will flow into the holes 2 of the uppermost layer of said component. At the moment of discharge, the permeability of the outer layer is a function of the hole area per unit of surface area and the absorbency, i.e. the amount of liquid which the surface layer material can absorb per unit of time. The hole area per unit of surface area around the wetting point is of decisive significance to the amount of liquid which can be absorbed instantaneously. It will be seen that the amount of liquid which is unable to flow simultaneously into the holes can be limited by appropriate selection of hole areas per unit of surface area to a value such that subsequent to such discharge, the surface spreading or dispersion of liquid is restricted to a relatively small area in the surface layer, so as to ensure that the liquid will not spread

to the edges of the article in which the absorbent component is included.

As will be seen from Figure 3, the four layers of material in the absorbent component do not abut one another. This has been achieved in the illustrated embodiment by utilizing the residual tendency of the folded parts A, B, C to return to their non-folded state. Of course, it will be necessary to apply other methods when the various layers of the absorbent component are formed by separate layers and not by folding a continuous material web. In this alternative case, spacer members in the form of ribs or the like can be formed on the undersides of the layers.

The liquid which flows through the holes in the uppermost layer will therefore flow onto the underlying absorbent material of the second layer. When the surface of this layer becomes saturated locally with liquid, the liquid will disperse to the third layer, by flowing through the holes in the second layer. This flow mechanism applies to all underlying layers. Because the layers are not in abutment with one another, the flow resistance exhibited by the absorbent component will be small, and from the aspect of flow, the component can be likened to a container having absorbent walls. The volume of this "container" is commensurate with the sum of the volume of the spaces between the layers and the total hole volume. Thus, the absorbent component is able to take-up, almost simultaneously, a quantity of liquid corresponding to this "container volume".

In addition to maintaining a very high permeability until the "container" is full, the inventive absorbent

component will have a greater absorbency than a homogeneous absorbent made from the same material. This will be more readily understood when considered in terms of a full "container". If the "container volume" is full, all absorbing surfaces in the "container walls" will be in contact with liquid simultaneously, therewith enabling the total capacity of the absorbent component to be rapidly utilized. Since the liquid comes into contact with underlying highly absorbent material almost immediately, this material can commence to absorb liquid immediately after a discharge has occurred. In the case of smaller quantities of liquid, the absorbency of the inventive component increases in comparison with a homogenous absorbent pad or body, because the liquid flowing down from a hole onto an underlying layer of the absorbent component will, in principle, be dispersed or spread in the same way as the liquid was spread from the wetting point, thus meaning that the liquid discharged will flow out in an underlying layer divided into a large number of wetting points, thereby increasing the surface area that can be used simultaneously for absorption purposes.

The absorbent component illustrated in Figure 3 is intended primarily for use with absorbent articles, such as incontinence guards, during the use of which large quantities of liquid can be expected to be discharged simultaneously, therewith requiring a large "container volume" in order to prevent surface spreading of liquid within an excessively large area. In other applications, for instance when used in diapers for small children, which require a smaller "container volume", the layers of the absorbent component may lie in abutment with one another. In this case, the hole patterns should be arranged so that the holes will



overlap one another, in order to enable the liquid to flow between the layers without hinder.

5 The absorbent component illustrated in Figure 3 has been produced by folding the material web part 1 illustrated in Figure 1 in a bellows-like fashion around the foldlines A, B, C, to produce the configuration illustrated in Figure 3.

10 Naturally, the inventive absorbent component can be produced in other ways. For instance, the web 1 can be cut along the lines A, B, C and the separate web parts placed one over the other and fastened together in a suitable manner, for instance with the aid of inter-  
15 mediate spacer means.

The invention thus provides an absorbent component of high permeability and absorbency and can be produced readily from a material web in which holes have been  
20 punched in a given pattern. When an inventive absorbent component is used in the absorbent pad of an absorbent, disposable article, surface spreading of liquid around the wetting point is restricted to a relatively small area, due to the good liquid dispersion properties of  
25 the inventive absorbent component in the depth extension thereof. This enables the total absorption capacity of the article to be concentrated to a relatively small area without increasing the risk of edge leakage before the total capacity of the article has been  
30 utilized.

It will be understood that the described absorbent component can be modified in many ways within the scope of the invention, particularly with regard to the  
35 configuration of the hole pattern, the shape of the

5 holes and the number of layers included in the absorbent component. For instance, the dimensions of the holes in the various layers can be decreased progressively, so as to provide a progressively increasing resistance to flow, and the bottom layer may be totally imperforate, so as to provide a closed "container" having absorbent walls. The invention is therefore solely limited by the contents of the following Claims.

Claims

1. An absorbent component for use in absorbent, disposable articles, such as diapers or incontinence  
5 guards, c h a r a c t e r i z e d in that the absorbent component is composed of at least two layers of absorbent material (1) which are perforated with holes (2) arranged in a determined pattern; and in that the  
10 patterns in mutually adjacent layers are displaced relatively to one another so that the holes in said layers will not lie in register with one another.

2. A component according to Claim 1, c h a r a c -  
t e r i z e d in that the layers are mutually spaced  
15 over a large part of their surfaces.

3. A component according to Claim 2, c h a r a c -  
t e r i z e d in that spacer means are arranged between said layers.

20 4. A component according to Claim 3, c h a r a c -  
t e r i z e d in that the absorbent component consists of a continuous web of material which is folded around hinge lines (A, B, C) to form a bellows-like construction, said hinge lines (A, B, C) constituting the  
25 spacer means of said component.

5. A component according to Claim 1, c h a r a c -  
t e r i z e d in that the various layers abut one  
30 another; and in that the holes (2) in the various layers overlap one another.

6. An absorbent component according to any one of the preceding Claims, c h a r a c t e r i z e d in that  
35 the holes (2) in each layer have mutually the same

size, whereas the hole size in each layer decreases successively from one side of the absorbent component to the other side thereof.

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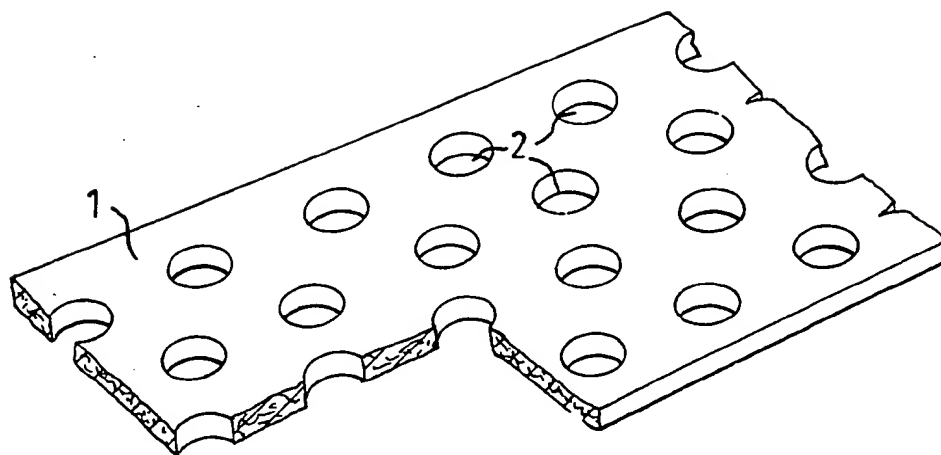


FIG. 1

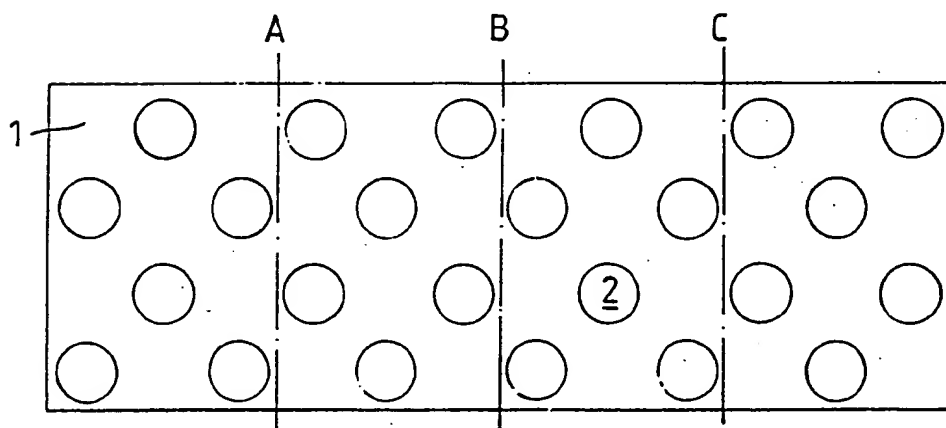


FIG. 2

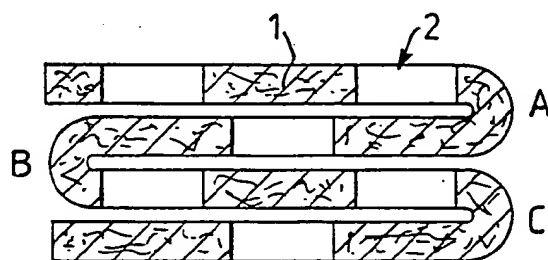
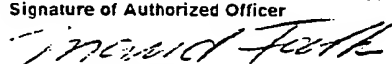


FIG. 3

## INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00837

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: A 61 F 13/46		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC5	A 61 F	
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in Fields Searched <sup>8</sup>		
SE,DK,FI,NO classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	DK, B, 117374 (PAGE ZELLSTOFFKREPP GMBH) 20 April 1970, see the whole document --	1-6
A	US, A, 3889679 (GLENN N. TAYLOR) 17 June 1975, see the whole document --	1-6
A	GB, A, 2105592 (COLGATE-PALMOLIVE COMPANY) 30 March 1983, see the whole document -- -----	1-6
<p>* Special categories of cited documents:<sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
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19th March 1991	1991 -03- 20	
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00837**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on **91-02-28**.  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DK-B- 117374	70-04-20	NONE	
US-A- 3889679	75-06-17	AT-B- 347379	78-12-27
		AU-D- 7779575	76-08-05
		BE-A- 825167	75-05-29
		CH-A- 580398	76-10-15
		DE-A- 2504296	75-08-07
		FR-A-B- 2259550	75-08-29
		GB-A- 1483951	77-08-24
		JP-C- 1148374	83-05-26
		JP-A- 50133038	75-10-21
		JP-B- 57035281	82-07-28
		NL-A- 7501281	75-08-06
		SE-B-C- 400459	78-04-03
		SE-A- 7501062	75-08-05
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		US-A- 4443512	84-04-17

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